IN THE CLAIMS

1.   (Currently Amended) A method performed in an access node of a wavelength division multiplexing optical network, the method comprising:

      receiving a demand for allocating a protection path that meets a set of disjointness constraints with respect to a working path, the protection path suitable to be shared with one or more other working paths, each of the working paths associated with a priority for obtaining the shared protection path; and

      in response to the demand, selecting a protection path that meets the set of disjointness constraints with respect to the working path and has not been shared with another working path having the same priority as the working path associated with the protection path in demand, wherein the selected protection path is selected from a plurality of protection paths and wherein each of the protection paths is shared by a group of a plurality of working paths in a 1:N protection scheme, <u>wherein each of the working paths in the group of plurality of working paths only use the selected protection path for protection,</u> wherein each of the working paths within the group is associated with a different and unique priority, such that when multiple working paths sharing the same protection path fail simultaneously, a failed working path with a higher priority retains the shared protection path.

2.   (Original) The method of claim 1, wherein each of the protection paths suitable to be shared by multiple working paths is maximally shared by a predetermined number of working paths, wherein the protection path is selected when the corresponding number of working paths currently sharing with the selected protection path is less than the predetermined number of working paths.

3.   (Original) The method of claim 2, wherein each of the protection paths in the network includes a counter stored in a database to count number of the working paths currently sharing the protection path, wherein the method further comprises incrementing the counter in response to the selection.

4.   (Original) The method of claim 1, further comprising recording in a database priorities of working paths currently sharing with the protection to ensure that no more than one working path having the same priority sharing with the protection path.

5.   (Original) The method of claim 4, further comprising recording the priority of the working path associated with the protection path in demand in the database in addition to the existing priorities of the working paths currently sharing with the protection path.

6.   (Original) The method of claim 1, wherein selecting the protection path comprises:
            locating in a database an existing protection path that meets a set of disjointness
                    constraints with respect to the working path, the existing protection path
                    currently being shared with one or more other working paths; and
            selecting the existing protection path as the protection path in demand if the existing
                    protection path is not shared with a working path having the same priority of
                    the working path associated with the protection path in demand.

7.   (Original) The method of claim 6, further comprising performing selecting the existing protection path if number of the working paths currently sharing with the existing protection path is less than a predetermined number of working paths maximally sharing a protection path.

8.   (Original) The method of claim 7, wherein the predetermined number of working paths that maximally share with a protection path is specified by an owner of the network.

9.   (Currently Amended) The method of claim 6, wherein if the existing protection path ~~cannot be found~~is shared with another working path having the same priority, the method further comprising:

    locating an unallocated path that meets the set of disjointness constraints with respect
        to the working path; and
    selecting the unallocated path as a protection path for the demand.

10.   (Original) The method of claim 9, further comprising:
    indicating the selected unallocated path as a protection path; and
    incrementing a counter associated with the selected protection path, the counter
        indicating number of working paths currently sharing the selected protection
        path.

11.   (Original) The method of claim 9, further comprising:
    recording the priority of the working path associated with the demanded protection
        path,
    wherein the priority of the working path associated with the demanded protection is
        used to ensure that no more than one working path having the same priority
        sharing with the protection path.

12.   (Original) The method of claim 9, wherein if the unallocated path is not located, the method further comprises performing contention resolution against another protection path based on the set of disjointness constraints required by the respective protection path.

13.   (Original) The method of claim 12, wherein an existing protection path is preempted and assigned as a protection path in demand if the existing protection path has a lower priority than the one in demand based on the respective set of disjointness constraints.

14.   (Original) The method of claim 1, wherein the set of disjointness constraints includes one or more of maximally link disjoint, fully link disjoint, maximally node disjoint, and fully node disjoint.

15.   (Currently Amended) An apparatus, comprising:

an access node, to be coupled in a wavelength division multiplexing optical network, including,

a database to store a representation of available paths from the access node to reachable destinations, the available paths including one or more working paths protected by one or more protection paths, and each of the working paths having a priority for obtaining one of the protection path shared by multiple working paths, and

a path selection module to select from the database a protection path that meets a set of disjointness constraints with respect to a given working path and has not been shared with another working path having the same priority as the given working path, wherein the selected protection path is selected from a plurality of protection paths and wherein each of the protection paths is shared by a group of a plurality of working paths in a 1:N protection scheme, wherein each of the working paths in the group of plurality of working paths only use the selected protection path for protection, wherein each of the working paths within the group is associated with a different and unique priority. such that when multiple working paths sharing the same protection path fail

simultaneously, a failed working path with a higher priority retains the shared protection path.

16.   (Original) The apparatus of claim 15, wherein for each of the protection paths suitable to be shared with multiple working paths, the database stores a number representing number of working paths that can maximally share the respective protection path, wherein the protection path is selected if the corresponding number of working paths currently sharing with the protection path is less than number of working paths maximally sharing with the protection path.

17.   (Original) The apparatus of claim 16, wherein the number representing number of working paths that can maximally share a protection path is specified by an owner of the network.

18.   (Original) The apparatus of claim 15, wherein for each of the protection paths suitable to be shared with multiple working paths, the database further stores a number representing number of the working paths currently sharing with the respective protection path.

19.   (Original) The apparatus of claim 15, wherein for each of the protection paths suitable to be shared with multiple working paths, the database further stores priority information of all working paths currently sharing with the respective protection path, wherein the priority information is used to ensure that no more than one working path having the same priority sharing a protection path.

20.   (Original) The apparatus of claim 19, wherein in response to the selection of the protection path, the path selection module stores the priority of the working path associated with the selected protection path in the database.

21. (Currently Amended) A method performed in an access node of a wavelength division multiplexing optical network, the method comprising:

receiving a fault notification of a first working path having a first priority;

determining a protection path associated with the first working path and whether the protection path is being used by a second working path having a second priority; and

assigning the protection path to the first working path if the first priority is higher than the second priority, wherein the assigned protection path is selected from a plurality of protection paths and wherein each of the protection paths is shared a group of a plurality of working paths in a 1:N protection scheme, wherein each of the working paths in the group of plurality of working paths only use the selected protection path for protection, wherein each of the working paths within the group is associated with a different and unique priority, such that when multiple working paths sharing the same protection path fail simultaneously, a failed working path with a higher priority retains the shared protection path.

22. (Original) The method of claim 21, further comprising comparing the first and second priorities, wherein the protection path is assigned to the working path having a higher priority.

23. (Original) The method of claim 21, further comprising rerouting traffic of the second working path by allocating another path to take over the traffic.

24. (Original) The method of claim 23, further comprising:

removing the second priority from priorities of working paths currently sharing the protection path; and

decrementing number of working paths currently sharing the protection path.

25.   (Original) The method of claim 21, wherein if the first priority is lower than the second priority, the method further comprises rerouting traffic of the first working path by allocating another path to take over the traffic of the first working path.

26.   (Original) The method of claim 25, further comprising:
    removing the first priority from priorities of working paths currently sharing the
        protection path; and
    decrementing number of working paths currently sharing the protection path.

27.   (Currently Amended) The method of claim 21, <u>if the first priority is higher than the second priority</u><s>wherein if the protection path is not being used by the second working path</s>, switching traffic of the first working path to the protection path.

28.   (Original) The method of claim 27, further comprising indicating in a database that the protection path is being used by the first working path.

29.   (Original) The method of claim 21, further comprising indicating in a database that the first working path is down.

30.   (Currently Amended) An apparatus, comprising:
    an access node, to be coupled in a wavelength division multiplexing optical network,
        including,
        a database to store a representation of available paths from the access node to
            reachable destinations, the available paths including one or more
            working paths associated with one or more protection paths that meet a

set of disjointness constraints with respect to the respective working path, and each of the working paths having a priority for obtaining one of the protection path shared by multiple working paths, and

a routing module, in response to a fault notification of a first working path having a first priority, to

determine from the database a protection path associated with the first working path and whether the protection path is being used by a second working path having a second priority, and

assign protection path to the first working path if the first priority is higher than the second priority, wherein the assigned protection path is selected from a plurality of protection paths and wherein each of the protection paths is shared by a group of a plurality of working paths in a 1:N protection scheme, <u>wherein each of the working paths in the group of plurality of working paths only use the selected protection path for protection,</u> wherein each of the working paths within the group is associated with a different and unique priority, such that when multiple working paths sharing the same protection path fail simultaneously, a failed working path with a higher priority retains the shared protection path.

31.　(Original) The apparatus of claim 30, wherein the routing module compares the first and second priorities, wherein the protection path is assigned to the working path having a higher priority.

32.　(Original) The apparatus of claim 30, wherein the routing module reroutes traffic of the second working path by allocating another path to take over the traffic.

33.   (Original) The apparatus of claim 32, wherein the routing module accesses the database to

> remove the second priority from priorities of working paths currently sharing the
>> protection path; and
>
> decrement number of working paths currently sharing the protection path.

34.   (Original) The apparatus of claim 30, wherein if the first priority is lower than the second priority, the routing module reroutes traffic of the first working path by allocating another path to take over the traffic of the first working path.

35.   (Original) The apparatus of claim 34, wherein the routing module accesses the database to

> remove the first priority from priorities of working paths currently sharing the
>> protection path; and
>
> decrement number of working paths currently sharing the protection path.

36.   (Original) The apparatus of claim 30, wherein the access node further comprises a signaling module to switch traffic of the first working path to the protection path if the protection path is not being used by the second working path.

37.   (Original) The apparatus of claim 36, wherein the routing module indicates in the database that the protection path is being used by the first working path.

38.   (Original) The apparatus of claim 30, wherein the routing module indicates in a database that the first working path is down.

39.   (Currently Amended) A method performed in an access node of a wavelength division multiplexing optical network, the method comprising:

  receiving a fault notification of a first protection path shared by a plurality of working paths;

  determining whether the first protection path is being used by a first working path that previously failed;

  determining whether the first working path has recovered if the first protection path is being used; and

  switching traffic of the first protection path back to the recovered first working path if the first working path has recovered, wherein each of the plurality of working paths is associated with a priority, no more than one working path having the same priority sharing the protection path, wherein each protection path is shared by a group of a plurality of working paths in a 1:N protection scheme, wherein each of the working paths in the group of plurality of working paths only use the selected protection path for protection, wherein each of the working paths within the group is associated with a different and unique priority, such that when multiple working paths sharing the same protection path fail simultaneously, a failed working path with a higher priority retains the shared protection path.

40.   (Cancelled)

41.   (Previously Presented) The method of claim 39, further comprising allocate a second protection path that meets a set of disjointness constraints with respect to the plurality of working paths sharing the second protection path.

42.   (Original) The method of claim 41, further comprising switching traffic of the first protection path to the second protection path if the first working path has not recovered.

43.   (Currently Amended) The method of claim 39, further comprising:
          recording in an entry of a database associated with ~~the~~ a second protection path the
                    priorities of the working paths sharing the second protection path; and
          recording in the entry of the database associated with the second protection path
                    number of the working paths sharing the second protection path.

44.   (Original) The method of claim 43, wherein the recordings are performed by copying the respective priorities and number of working paths from the respective entry of the database associated with the first working path.

45.   (Original) The method of claim 39, further comprising indicating in a database that the first protection path is down.

46.   (Currently Amended) An apparatus, comprising:
          an access node, to be coupled in a wavelength division multiplexing optical network,
                    including,
                    a database to store a representation of available paths from the access node to
                              reachable destinations, the available paths including one or more
                              working paths associated with one or more protection paths that meet a
                              set of disjointness constraints with respect to the respective working
                              path, and
                    a routing module, in response to a fault notification of a first protection path
                              shared by a plurality of working paths, to

determine from the database whether the first protection path is being

used by a first working path previously failed,

determine whether the first working path has recovered if the first

protection path is being used, and

switch traffic of the first protection path back to the recovered first

working path if the first working path has recovered, wherein

each of the plurality of working paths is associated with a

priority, no more than one working path having the same

priority sharing the protection path, wherein each protection

path is shared by a group of a plurality of working paths in a

1:N protection scheme, wherein each of the working paths in the

group of plurality of working paths only use the selected

protection path for protection, wherein each of the working

paths within the group is associated with a different and unique

priority, such that when multiple working paths sharing the

same protection path fail simultaneously, a failed working path

with a higher priority retains the shared protection path.

47.   (Cancelled)

48.   (Previously Presented) The apparatus of claim 46, wherein the routing module further
allocates a second protection path that meets a set of disjointness constraints with respect to
the plurality of working paths sharing the second protection path.

49.   (Original) The apparatus of claim 48, wherein the access node further comprises a
signaling module to switch traffic of the first protection path to the second protection path if
the first working path has not recovered.

50.   (Original) The apparatus of claim 48, wherein the routing module is to

record in an entry of the database associated with the second protection path the

priorities of the working paths sharing the second protection path; and

record in the entry of the database associated with the second protection path number

of the working paths sharing the second protection path.

51.   (Original) The apparatus of claim 50, wherein the routing module copies the respective

priorities and number of working paths from the respective entry of the database associated

with the first working path.

52.   (Original) The apparatus of claim 46, wherein the routing module indicates in the

database that the first protection path is down.